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From the Editors

The study of natural history is essentially an out-of-doors activity, a point amply demonstrated by the papers in this issue. Here we have the results of studies carried out in the field, reports of surveys conducted in order to increase our knowledge of a range of animals and plants. These reports also serve to indicate the various strategies and methods appropriate to the study of the target species. We feel confident that readers will find much of interest and value in this issue of *The Victorian Naturalist*.

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Front cover: Eastern False Pipistrelle *Falsistrellus tasmaniensis.* Photo by Peter Homan (see p. 47).
Back cover: Crimson Rosella *Platycercus elegans.* Photo by Dan Carey Photography.

Studies on Victorian bryophytes 8: The genus *Treubia* Goebel

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Abstract
The liverwort genus *Treubia* Goebel is represented in Victoria by a single species, *Treubia tasmanica* R.M.Schust & G.A.M.Scott. This species is described and illustrated, and its distribution and conservation status in Australia are discussed. *T. lacunosa* (Colenso) Prosk.is discounted from the Victorian flora. (*The Victorian Naturalist* **125** (2), 2008, 36-38)

Introduction

The genus *Treubia* Goebel at present comprises seven species, of which five are confined to the cool temperate regions of Australia, New Zealand and South America: *T. lacunosa* (Colenso) Prosk. (Tas, NZ), *T. lacunosoides* Pfeiffer *et al.* (NZ), *T. pygmaea* R.M.Schust. (NZ), *T. scapanioides* R.M.Schust. (Chile), and *T. tasmanica* R.M.Schust & G.A.M.Scott (Tas, Vic, NZ). Renner (2006) has suggested that another (perhaps undescribed) species may be present in New Zealand. Two other species are known, both from the tropics: *T. insignis* Goebel from Indonesia, Melanesia and Oceania, and *T. tahitensis* (Nadeaud) Goebel from Tahiti.

The genus is part of the ancient tribe Treubiopsida, which is of considerable interest to molecular biologists attempting to piece together relationships within the Marchantiophyta. The only other genus in the tribe is *Apotreubia* Hatt. *et al.*, comprising *A. hortonae* R.M.Schust. & Konstantinova from western North America, *A. nana* (Hatt. & Inoue) Hatt. *et al.* from eastern Asia, *A. pusilla* (R.M.Schust.) Grolle from New Guinea and *A. yunnanensis* Higuchi from China. *Apotreubia* differs from *Treubia* principally in having (a) terminal rather than lateral-intercalary branching, and (b) the male and female organs scattered over the dorsal surface of the midrib rather than in the axils of the lobules (Schuster and Konstantinova 1995).

In the course of this study all *Treubia* specimens from Victoria held in Australian herbaria were found to be *T. tasmanica*. *T. lacunosa*, which occurs in Tasmania and New Zealand (Glenny 1998) and had been reported from Victoria (McCarthy 2003), is thus discounted from the Victorian flora.

Similar taxa

Because of their fleshy nature, vivid colour and obvious dorsal lobes on the leaves, *Treubia* plants are easily differentiated from other liverworts. However, the species can be hard to tell apart. Only *T. lacunosa* and *T. tasmanica* have been reported from Australia (McCarthy 2003). *T. lacunosa* can be distinguished by the cells that contain oil bodies, which are much larger than the adjacent cells and somewhat yellowish in life, giving the surface a distinctly speckled appearance.

Description

The following description is based on living plants seen in Tasmania and Victoria. Dried specimens take a very long time to rehydrate and often do not regain their original form.

Treubia tasmanica R.M.Schust. & G.A.M.Scott, *Journal of the Hattori Botanical Laboratory* **32**: 248 (1969)
Plants thallose, green to lime green, in small pure colonies or creeping among other bryophytes, fleshy and rather brittle, anchored to the substrate by many rhizoids, colourless mucilage commonly present on ventral side. **Branching** infrequent, lateral-intercalary. **Shoots** 15 mm or more long, each branch up to 9 mm wide. **Thallus** with large lateral and small dorsal lobes; lateral lobes leaf-like, alternating along the axis of the thallus, spreading widely from the axis and overlapping succubously; dorsal lobes also alternating along the stem, much smaller and scale-

like, forming two distinct rows standing sharply up from the axis. **Gemmae** frequent in the axils of the dorsal lobes, pyriform, yellow-green, often with a colourless stalk. **Cells** ± isodiametric and uniform in size, typically 35–45 µm wide in mid-thallus, slightly smaller towards the margins. **Oil bodies** present in most cells of dorsal surface, 1–2 per cell, large, irregularly ellipsoid to globular, coarsely granular, opaque, pale brownish-grey, not persisting in dried specimens. **Rhizoids** unicellular, on ventral part of axis only. **Calyptra** ± globular, c. 2 mm in diameter, with a speckled appearance caused by cells containing oil-bodies. Mature calyptra up to 10 mm long (Fig. 1).

Type: Tasmania. Near Camp Creek, along Lyell Hwy, west of Derwent Bridge, Surprise Valley, on slopes of Mt Arrowsmith. R.M. Schuster 50376.

Known distribution: Tasmania, Victoria, New Zealand (Fig. 2).

Habitat: On damp or wet soil or rock in humid sites in wet forest and rainforest, usually associated with streams.

Notes: The family Treubiaceae is of considerable scientific interest because it is thought to represent an intermediate evolutionary stage between thalloid and leafy liverworts. The lateral lobes are considered by some to be leafy appendages, and by others as extensions of the axis of the thallus. Also of note is the dimorphism of the cells (ordinary vegetative cells and cells containing oil bodies) and the ability of the ventral region of the thallus to secrete copious amounts of mucilage that binds the thallus to the substratum.

The major distinction between *T. tasmanica* and *T. lacunosa* lies in the nature of the cells that contain oil bodies, as seen in the following key:

Fewer than 40% of cells in lobe bearing oil bodies; these cells sharply distinct in size, typically 2-4 times the diameter of adjacent cells, the oil body filling the lumen.....*T. lacunosa*

Fewer than 40% of cells in lobe bearing oil bodies; these cells not sharply distinct in size, up to 1.5 times the diameter of adjacent cells, the oil body often much smaller than the lumen.....*T. tasmanica*

Fig. 1. *Treubia tasmanica*. Photo by Bruce Fuhrer.

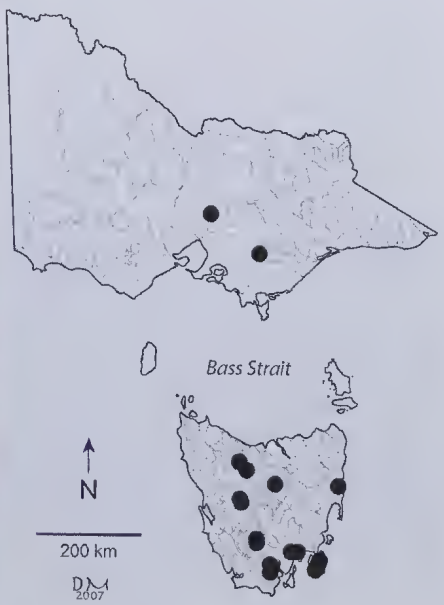

Fig. 2. Known distribution of *Treubia tasmanica* in Australia.

Conservation status

Treubia tasmanica is known from numerous sites in Tasmania, many of which are in permanent conservation reserves. Scott (1985) also reported *Treubia tasmanica* from two localities in Victoria, 'near Kinglake and Mt Baw Baw'. The collection from the Kinglake locality (1972) is in MELU, annotated 'road cutting, Kinglake–Yea Road'. Despite several searches over the last 10 years no-one has been able to relocate this site, and there seems to be no place along that road suitable for *Treubia* today. However, the presence of a population on a road cutting suggests there might be a population in the area from which spores could disperse occasionally. The collection from the Mt Baw Baw locality (1975) is in MELU (Melbourne University Herbarium) with duplicates in MEL (National Herbarium of Victoria) and HO (Tasmanian Herbarium), annotated 'road below Gantry Creek, Mt Baw Baw'. Searches of this locality (the correct name is Charity Creek) have failed to find the species, and it seems likely that a realignment of the road and other disturbances may have destroyed the population.

A few small populations were found recently on the West Tyers River, one of which is within Special Protection Zone 481/01 in Tanjil State Forest (DSE 2004), about 4 km from the Charity Creek site. A major new forestry road has been constructed recently through this SPZ, and a large section of the river bank close to the site has collapsed. The spread of blackberries and other weeds along the new road and into the river at this site, as well as rubbish dumping, trampling by visitors, and the risk of myrtle wilt and wildfire, could affect the viability of the population. The other populations are also in State Forest but outside the Special Protection Zone. Myrtle wilt is present at one site (pers. obs.), and wildfire is a constant threat. Substantial efforts were made in 2006 and 2007 to locate other populations in other parts of this catchment, but none was found.

Under the existing IUCN guidelines for assessing the conservation status of bryophytes (Hallingbeck *et al.* 2000), *Treubia tasmanica* should be classified as 'EN – endangered' in Victoria (satisfying criteria B, C2 and D) but 'LR (lc) – Lower Risk (least concern)' in Tasmania and Australia.

Acknowledgements

Many thanks are due to Neville Scarlett and Chris Cargill for advice and assistance in preparing this paper, and to Bruce Fuhrer for permission to use his photograph of *Treubia tasmanica*. Thanks also to the curators at the Australian National Botanic Gardens Herbarium, University of Melbourne Herbarium, National Herbarium of Victoria and Tasmanian Herbarium for access to collections and data. Surveys undertaken in the Baw Baw Ranges were supported by a Natural Heritage Trust grant administered by the Department of Sustainability and Environment, Victoria.

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Golden Sun Moth *Synemon plana* (Lepidoptera: Castniidae): results of a broad survey of populations around Melbourne

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Abstract
The Golden Sun Moth *Synemon plana* is a medium-sized diurnal moth considered to be critically endangered in Australia. The discovery of new populations around Melbourne since 2002 suggest that *S. plana* is more widespread and may have less specific habitat requirements than previously thought. A survey was undertaken during the species' 2006/7 flight season, with the aim of improving our understanding of its distribution in the Melbourne area. This report summarises the findings of that survey. (*The Victorian Naturalist* **125** (2), 2008, 39-46)

Introduction

Golden Sun Moth *Synemon plana* is a medium-sized diurnal moth from the family Castniidae, listed as critically endangered in Australia under the *Environment Protection and Biodiversity Conservation Act* 1999 (Fig. 1). The species was thought to inhabit just six areas in Victoria until 2003 when new populations were discovered at the Craigieburn and Cooper Street Grasslands north of Melbourne. In response to these discoveries, a number of targeted surveys for *S. plana* have been undertaken (principally by flora and fauna consultants) on land proposed for development around Melbourne. A report on the discovery of new populations around Melbourne was recently published by Endersby and Koehler (2006).

Discovery of the new populations around Melbourne suggests *S. plana* is more widespread and may have less specific habitat requirements than previously thought (Endersby and Koehler 2006). An investigation has since been under way to improve our understanding of the distribution of the species in the Melbourne area. This report summarises the findings of a targeted survey conducted during the 2006/7 flight season. A second survey is planned for the 2007/8 flight season and it is intended to report on those results once they become available.

Methodology

Survey site selection

Given recent findings, the choice of survey sites for the present survey was based on limited assumptions about habitat suitability.

Criteria for selection of sites were as follows:

- The site supports either native grassland or grassy woodland as the dominant vegetation type;.
- Due to access constraints, sites were predominantly on public land; sites on private land were surveyed where possible;
- Sites were within the species' overall historic range in the outer Melbourne area but were locations where *S. plana* previously had not been recorded;
- Sites were 0.5 ha or greater in size.

Potential sites were identified from a variety of sources, including Parks Victoria, Department of Sustainability and Environment (DSE), City of Hume, Shire of Melton, Biosis Research unpublished data and other sources. Typically, sites were managed primarily for conservation purposes by Parks Victoria or local councils. One benefit of surveying conservation reserves is that it provides information on how well *S. plana* is represented in Melbourne's system of grassland reserves. Survey was undertaken at 30 sites. The surveyed sites are listed in Table 1 and shown in Fig. 2.

Fig. 1. Female Golden Sun Moth *Synemon plana*.

Field survey

Survey was undertaken during the 2006-7 flight season of *S. plana*. The known population of *S. plana* at the Craigieburn Grassland Reserve was used as an indicator to determine when the flight season commenced. As female *S. plana* are cryptic and do not fly regularly, survey focused on the detection of flying male moths (Gibson and New 2007). When male moths began flying in good numbers at Craigieburn, it was assumed that males in other populations around Melbourne would also be flying, thereby allowing detection. The Craigieburn population was monitored from mid October 2006 and thereafter at regular (weekly) intervals until male moths were no longer observed flying. Survey ceased after moths had stopped flying at Craigieburn, which occurred in early January 2007 (W Moore, pers. obs.).

Survey took place on days when conditions were suitable for male flight (> 20 C, bright, clear days, full sun, absence of rain and wind other than a light breeze) between the hours of 10:00 hrs and 14:00 hrs. Weather conditions were monitored on a daily basis using the Australian Bureau of Meteorology weather report for Melbourne as a guide (www.bom.gov.au).

The objective of each survey was to document the presence/absence of the species at a given site. To account for possible between-site variation in emergence time, an attempt was made to survey each site three times during the flight season. While this was achieved for most sites, some were surveyed only twice. Once the species had been located at a site it was not surveyed again.

Only observers familiar with field identification of *S. plana* conducted the survey. It was decided that a transect method of searching would be the most productive for determining presence/absence of *S. plana* (Gibson and New 2007). Transect survey allowed a much larger area to be searched in the limited time available and *S. plana* could often be 'flushed' from the ground by the observer, even when they were not flying voluntarily (D Gilmore, pers. obs.). Survey was carried out by one or two people and transects were generally 5 to 10 m apart to cover the whole site.

On any given day when conditions were suitable for survey, generally one to four

Table 1. Details of the 2006/7 Golden Sun Moth survey sites, Melbourne.

Site	Land tenure	Size (ha)	Survey dates	Search effort (mins)
1 Greenvale	Private	2	8/12/06	30
2 Pioneer Park	Public	3	23/11/06, 18/11/06, 9/11/06	120
3 Banchory Grove	Public	25	23/12/06, 9/11/06, 18/11/06	180
4 Evans Street Grassland	Public	4	23/12/06, 18/11/06, 9/11/06	180
5 Derrimut Grassland Reserve	Public	177·8	10/11/06	300
6 Mt Derrimut Grassland Reserve	Public	30	10/11/06, 21/12/06, 30/12/06	285
7 Altona	Private	49	18/11/06	210
8 Laverton North Grassland	Public	52·3	18/11/06, 19/11/06, 21/12/06	450
9 William Angliss Grassland	Public	68·4	19/11/06	240
10 Iramoo Grassland Reserve	Public	31·1	21/11/06, 21/12/06	240
11 Bush's Paddock	Public	8·9	24/11/06, 18/12/06	300
12 Altona	Private	33·7	24/11/06	120
13 Harcourt Road Grassland Reserve	Public	5·4	24/11/06, 21/12/06	180
14 Laverton North	Private	5·5	24/11/06	100
15 Oaklands Junction	Private	50	28/11/06, 8/12/06	360
16 Woodlands Historic Park	Public	775·4	28/11/06	60
17 Greenvale	Private	Unknown	28/11/06	60
18 Oaklands Junction	Private	50	8/12/06	360
19 Oaklands Junction	Private	Unknown	8/12/06	70
20 Greenvale	Private	Unknown	28/11/06	40
21 Jukes Road	Public	60	23/11/06, 18/11/06, 9/11/06	170
22 Leonard Street	Public	10	23/11/06, 9/11/06, 18/11/06	120
23 Central Creek Grassland	Public	14	10/11/06, 19/11/06, 9/12/06	180
24 Maygar	Public	4	10/11/06, 19/11/06, 9/12/06	300
25 Upfield Railway Line	Public	2·5	11/11/06	40
26 Isabella Williams Memorial Reserve	Public	30	12/11/06, 22/11/06, 7/01/07	300
27 Denton Avenue	Public	3	12/11/06, 22/11/06, 7/01/06	130
28 McCorkells Road	Public	6	18/11/06, 22/12/06, 7/01/07	315
29 Campbelfield Racetrack	Public	2·5	19/11/06	110
30 Laura Douglas Reserve	Public	15	19/11/06, 8/01/07, 9/01/07	140

sites were visited. Each site was surveyed for between one and three hours during each visit, depending on the size of the site and the number of surveyors.

At sites where *S. plana* were recorded, a waypoint location was taken using a hand-held GPS unit. A voucher specimen was collected from each site where the species was found and lodged with Museum Victoria. Specimens were collected under DSE Research Permit Number 10003638.

Results

Present survey

Monitoring of the Craigieburn 'control site' *S. plana* population showed that the 2006-7 flight season commenced around 30 October.

Survey commenced on 10 November 2006 and continued until 9 January 2007, the last date when *S. plana* were observed flying at Craigieburn. Of the 30 sites surveyed during 2006-7, *S. plana* were recorded at 12 (40% of) sites (Fig. 2). Of these sites, five were on public land and seven on private land (Fig. 2, Table 2). Of the sites where the species was recorded on public land, three were in conservation reserves managed by Parks Victoria (Woodlands Historic Park, William Angliss Native Grassland Reserve and Derrimut Grasslands) which increases the number of Parks Victoria grassland reserves around Melbourne known to support the species from two (Craigieburn and Cooper Street) to five.

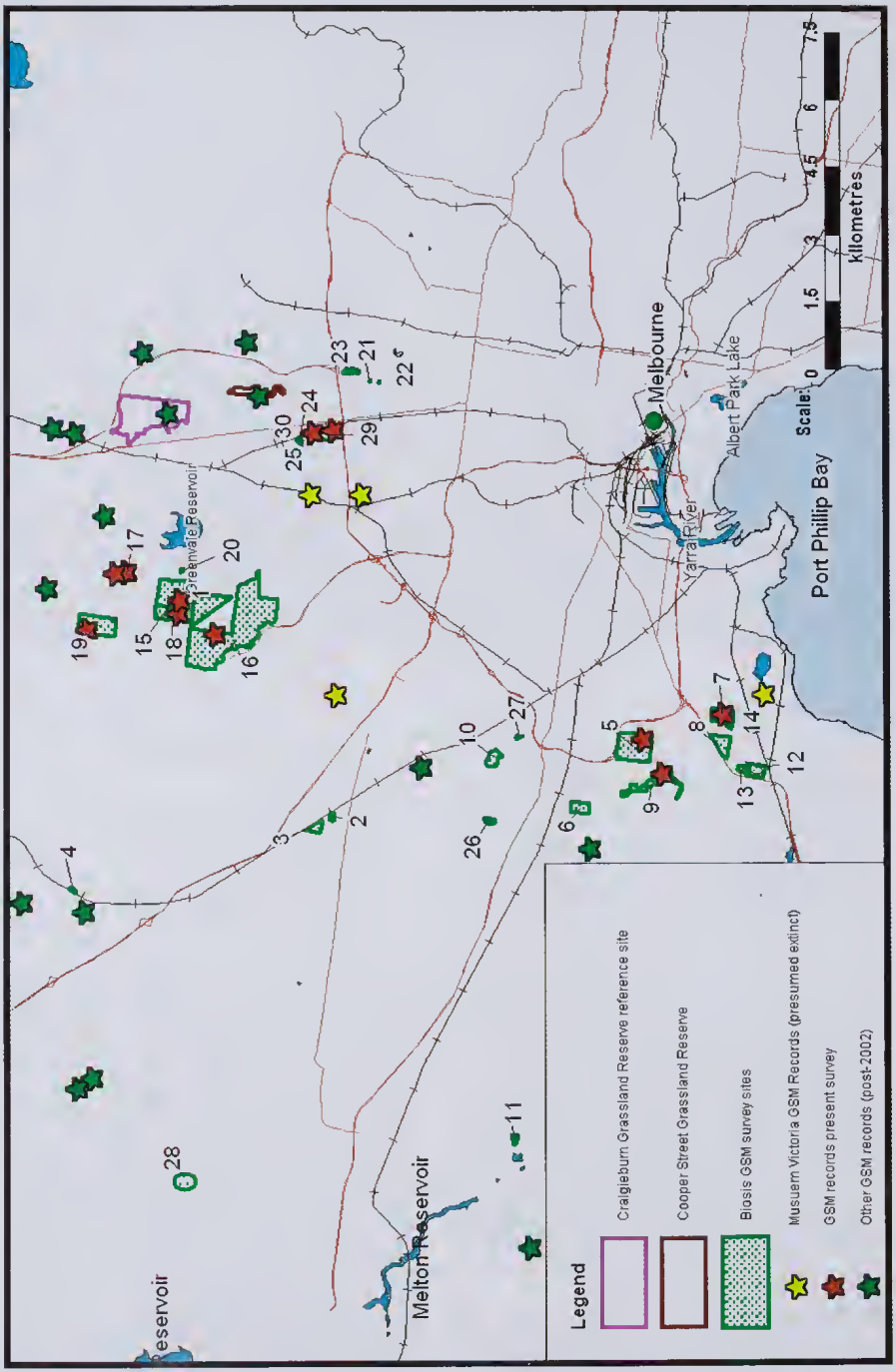

Fig. 2. Survey sites and distribution of Golden Sun Moth in the Melbourne Area.

Table 2. Locations where Golden Sun Moths were recorded during the 2006/7 flight season. NB. All *Synemon plana* were detected on the first survey at each of the listed sites.

Site	Land tenure	Max. no. of *Synemon plana* seen
5 - Derrimut Grassland Reserve	Public	10 males
7 - Altona	Private	500 males, 3 females
9 - William Angliss Grassland	Public	1 male, 1 female
14 - Laverton North	Private	10 males, 2 females
15 - Oaklands Junction	Private	100s of males, 8 females
16 - Woodlands Historic Park	Public	2 males
17 - Greenvale	Private	20+ males
18 - Oaklands Junction	Private	20 males, 2 females
19 - Oaklands Junction	Private	5 males
20 - Greenvale	Private	5 males
29 - Campbellfield Racetrack	Public	2 males
30 - Upfield Railway Line	Public	3 males

An additional site in Meredith (west of Melbourne) was confirmed after discussion with Brian Bainbridge from Merri Creek Management Committee. Biosis Research conducted a survey of the site on 13 December but no moths were recorded.

Interestingly, at sites where *S. plana* were found, they were always recorded on the first survey date (Table 2). If *S. plana* were not recorded on the first date of survey, they were not recorded from that site during subsequent visits. An exception to this was the site at Meredith, where a single female *S. plana* was photographed by the landowner on 24 November 2006. A follow-up survey of this site on 13 December did not find any moths, although the habitat appeared to be suitable. The sky was darkened by thick smoke haze on the day and this may have affected moth activity.

Although no rigorous assessment was made of the size of the populations that were recorded, the number of moths observed varied markedly between sites. For example, only two moths (a male and female) were observed at William Angliss Grassland (Site 9), while an estimated 500 moths were recorded on private land at Site 7 in Altona. Hundreds of moths were also recorded on private land at Site 15 in Oaklands Junction (Table 2). Variation in the number of moths recorded may be an artefact of the lack of systematic survey at sites where the species was recorded, since observers moved to another survey location once the presence of the species at a site had been confirmed. Nevertheless, the largest populations observed were all on private land.

The relatively large number of sites where *S. plana* were recorded around Oaklands Junction/Greenvale may represent a very extensive local population (Fig. 2). However, due to land tenure and time constraints, much of this area could not be fully surveyed.

Previous records

Prior to 2003, there were only four records of *S. plana* from Melbourne. Museum Victoria and the Atlas of Victorian Wildlife have records from the early 1900s from near Keilor, Broadmeadows and Laverton (Fig. 2). The current status of these populations is not known. However, due to loss of habitat they may be extinct.

At least 15 *S. plana* populations (sites), additional to those found in the present study, have been discovered in Melbourne's north and west since 2003 (Endersby and Koehler 2006; Biosis Research unpub. data). These include populations discovered in the Craigieburn and Cooper Street Grasslands in 2003 (Van Praagh 2004; Endersby and Koehler 2006).

Most of these additional populations were discovered as part of flora and fauna assessments of grasslands that will be lost to residential development. Due to their recent nature, details of these populations were sourced mostly from unpublished consultant reports and discussions with the Merri Creek Management Committee and DSE. Locations of all known populations of *S. plana* near Melbourne are shown in Fig. 2.

Discussion

The results of this survey suggest that the methods used were appropriate for detecting *S. plana* at a range of sites around Melbourne.

Surveys since 2003 have located at least 27 new *S. plana* populations (sites) around Melbourne. The current survey alone documented 12 (44%) of these new localities. This apparent surge in records reflects a greater understanding of the peculiar survey requirements of the species and greater survey effort in recent years. It is also likely that our increased knowledge of the species' habitat has led to surveys in areas previously deemed unsuitable. The present survey, combined with other surveys conducted since 2003, confirms that *S. plana* is widespread but patchily distributed on Melbourne's northern and western outskirts.

Many of the sites where *S. plana* recently has been recorded support habitat very different from what previously was considered suitable for the species. Indeed, many of the sites support a much lower cover of *Austrodanthonia* spp. than the 40% previously thought necessary to support the species (O'Dwyer and Attiwill 1999). It is now well established that *S. plana* has much broader habitat requirements than previously thought (Clarke 1999; Endersby and Koehler 2006; Gibson 2006). The findings of the present survey largely concur with these previous studies.

Although *Austrodanthonia* grasses were present at all sites where *S. plana* were recorded, this genus is a widespread component of grasslands around Melbourne, even in patches supporting predominantly introduced vegetation. Many of the sites where the species was recorded were heavily infested with Chilean Needle-grass *Nassella neesiana* and other exotic grasses. It has been suggested that *S. plana* may not be restricted to using *Austrodanthonia* as larval food plants and that it may feed on other grasses including species from the genera *Nassella* and *Bothriochloa*. While the present survey could not confirm this, female *S. plana* were observed ovipositing on *N. neesiana* on several occasions and cast pupa cases of this species were found among a dense sward of *N. neesiana* at Oaklands Junction. Braby and Dunford (2006) have also observed *S. plana* ovipositing on *N. neesiana*. In addition, the species has been observed ovipositing on spear-grasses *Austrostipa* spp. and Weeping Grass *Microlaena stipoides* (Gibson 2006). Culture of larvae in a controlled environment is the only way to determine conclusively if *S. plana* can successfully complete their life cycle on grasses other than *Austrodanthonia*.

It was beyond the scope of the current survey to undertake detailed habitat investigations at sites supporting *S. plana* and compare these to unoccupied sites. A number of qualitative observations were made of sites where *S. plana* were recorded in 2006-7. Compared to unoccupied sites, sites supporting *S. plana* tended to be relatively low, open grasslands with areas of bare ground (inter-tussock space). At one site supporting both closed grassland and open grassland in close proximity, dense swards of grasses such as Kangaroo Grass *Themeda triandra* appeared to be actively avoided, with male moths confining their patrolling activities to an area subject to regular mowing. This is consistent with the observations of other authors, who also found *S. plana* to be more abundant in areas that were relatively open with a reduced biomass (Gibson 2006). It is possible that patrolling male moths prefer these areas because it makes it easier for them to locate displaying females (Gibson 2006).

Most of the occupied sites were subject to regular biomass reduction activities including livestock grazing, herbicide application, slashing and fire.

Over half of the sites where *S. plana* were recorded during the present survey were on private land and 11 (73%) of the 15 additional localities shown on Fig. 2 are on private land.

The future for *S. plana* on private land sites is uncertain, since they are generally not managed for conservation and some are under imminent threat from urban and industrial development. Many of these sites appear to support large populations of *S. plana* and, with the exception of Craigieburn Grassland Reserve, the species may be more abundant on these sites than in conservation reserves. However, it is important to note that the true extent and size of many of the populations at known sites is poorly understood (see further work below).

Even the populations on public land are not necessarily secure, since some of these sites are not managed for biodiversity and some, such as the land reserved for the proposed Deer Park Bypass, will be affected by habitat removal in the near future.

Although focusing on public land, with limited searches on private land, the survey confirms that the species is widespread north and west of Melbourne.

The extent and size of the populations still need to be determined at the identified sites, particularly those in conservation reserves such as Derrimut Grassland. This information will assist in determining the relative importance of populations and establishing priorities for conservation and management. Information gathered during the 2006-7 study highlights the need to further refine knowledge of what constitutes optimal habitat for *S. plana*.

In the past, surveys for *S. plana* in Melbourne and elsewhere in the species' range have not focused on private land (Clarke 1999). However, it is suspected that *S. plana* may be widespread on private land on Melbourne's northern and western outskirts. Knowledge that the species has broader habitat requirements than previously thought opens the possibility that suitable habitat is more widespread and indicates that the potential to locate additional populations has increased (Clarke 1999). Therefore, future surveys should attempt to gain access to a greater number of sites on private land, particularly locations where habitat meets the minimum requirements now known for the species.

An inherent limitation of this study was that site selection was based on the presence of either native grassland or grassy woodland. However, it is known that *S. plana* can occur in highly modified grasslands, including sites supporting predominantly introduced grasses (Clarke 1999; Braby and Dunford 2006; Endersby and Koehler 2006; this study). Apart from a few sites on private land where exotic grasslands occur, the current study focused on areas supporting native vegetation. By selecting sites supporting mostly native vegetation, this study was inherently biased. It would therefore be of value for future surveys to assess grasslands of varying quality, including those dominated by introduced species.

The life cycle of *S. plana* is thought to be 2-3 years, in common with other members of the genus (Edwards 1994). This raises the possibility that at any given site there may be two cohorts (populations) of *S. plana*, which emerge on alternate years, and that one of these cohorts is larger than the other (e.g. Endersby and Koehler 2006). While this may be the case, there is no information to suggest that there are years when moths do not emerge at an occupied site. Indeed, at Craigieburn, where the population has been regularly monitored since 2003, moths have been observed each year, albeit with varying population sizes (W Moore, pers. obs.). This is also the case for occupied sites in the ACT (T Edwards, pers. comm.).

It is interesting to note that at each site where *S. plana* were recorded, the recording was on the first day of survey. In devising a methodology for survey of *S. plana*, we believed that it would be necessary to survey sites a total of six times over two flight seasons (to account for a possibility that adults do not emerge every year) to be reasonably confident that the species was, or was not, present. Data from the current survey suggest that such intensive survey effort may not be warranted, provided that the site is systematically searched using the transect method, and surveys are undertaken under ideal conditions, preferably in the middle of the flight season (when moth abundance peaks) and conducted on days when flying is confirmed at a known reference site nearby. Confirmation of flying at known sites nearby may be the most important consideration when planning presence/absence surveys for the species (Clarke 1999). Based on the results of the current survey, it appears that the onset and cessation of moth emergence does not vary substantially between sites within a region, presumably because of similarities in climatic variables such as temperature and rainfall, which are suspected to affect emergence time. Nevertheless, caution needs to be exercised when interpreting the results of surveys undertaken early or late in the flight season, as subtle inter-site differences in the onset and cessation of emergence are still likely.

Conclusion

Based on the results of our survey, we believe that the survey effort required to be reasonably confident *S. plana* is present at a given site can be reduced to two visits in one flight season (provided the steps highlighted above are adhered to). This is consistent with the survey effort recommended by Clarke (1999). By reducing the need for repeat surveys, the number of sites surveyed can be substantially increased during a season, which is important for species whose 'window' of detectibility is limited in any given year.

The Golden Sun Moth is more widespread and apparently more abundant in the Melbourne region than previously thought. The implications of these findings for the conservation status of the Golden Sun Moth ultimately will need to be considered.

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One Hundred Years Ago

EXCURSION TO THE YOU YANGS

Presently the rock mass came in view, and on reaching it we were astonished at its extent. It must be nearly 100 yards in diameter, and at its southern edge rises about 80 feet above the hillside, the northern edge being flush with the mountain side. Some one with a penchant for figures has calculated that it contains about 4,000,000, cubic feet of stone, and would weigh about 300,000 tons.

From *The Victorian Naturalist* **XXV** p. 126, December 1908

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Fauna Survey Group Coutribution no. 25

Surveys of vertebrate fauna in the Grampians National Park, 2003-2007

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Abstract
Surveys of vertebrate fauna in the Grampians National Park were carried out between December 2003 and March 2007. One hundred and fourteen species were recorded, including thirty mammals, seventeen reptiles, three amphibians and sixty-five birds. Four threatened species were recorded: Smoky Mouse *Pseudomys fumeus*, Heath Mouse *Pseudomys shortridgei*, Southern Brown Bandicoot *Isoodon obesulus* and Powerful Owl *Ninox strenua*. Smoky Mouse was found in two locations and the status of the species in the Grampians is discussed. The possible effects of drought and bush fires on populations of insectivorous bats also are discussed. (*The Victorian Naturalist* **125** (2) 2008, 47-55)

Introduction

The Grampians National Park covers 167 000 hectares and is located in western Victoria, approximately 225 kilometres west of Melbourne. The park is one of the most important crown conservation reserves in Victoria, with a wide range of vegetation communities that provide habitat for many vertebrates including a number of rare and threatened species.

The Fauna Survey Group (FSG) of the Field Naturalists Club of Victoria conducted five surveys of vertebrate fauna in the park on a voluntary basis between December 2003 and March 2007. The purpose of the surveys was to provide data for the land manager, Parks Victoria, on the distribution and ongoing presence of vertebrates, especially several threatened species known to exist in the park. These species include the endangered Smoky Mouse *Pseudomys fumeus*, the near threatened Heath Mouse *Pseudomys shortridgei*, the near threatened Southern Brown Bandicoot *Isoodon obesulus* and the endangered Long-nosed Potoroo *Potorous tridactylus* (DSE 2003). The data were to be used by the land manager to help implement threatened species conservation programs and to assist in the planning of ecological burning programs for the park. During the summer of 2005/2006 a wildfire burnt approximately 46% of the Grampians National Park. The FSG did not conduct post-fire surveys in areas burnt by this fire. However, the effects of the fire on vertebrates are discussed.

The park was visited on five occasions and surveys were conducted in several locations as follows:

- December 2003: southern Victoria Range and central Victoria Valley;
- March 2004: southern Victoria Range and southern and central Victoria Valley;
- March 2005: Mt William Range and central Wannon Valley;
- March 2006: central and southern Wannon Valley;
- March 2007: southern and far southern Victoria Valley.

Methods

Survey methods included Elliott trapping, Type A (Elliott Scientific Equipment, Upwey), cage trapping (standard bandicoot traps, Wiretainers Pty Ltd, Preston and RE Walters 1899 Pty Ltd, Sunshine), harp trapping (Ecological Consulting Services, Newport and Faunatech, Bairnsdale), funnel trapping (Ecosystematica Environmental Consultants, WA), spotlighting, active herp searching (rock and log turning and scanning possible reptile basking sites with binoculars), bird observation and general observation (chance sightings around campsites and along roads, road-kills etc.).

Cage and Elliott traps were set in lines of ten, with 25 m between trap-lines. The distance between trap sites varied depending on the terrain. In difficult terrain, such as on the summit of Mt William, trap sites

were 10 m apart, whilst, in more open areas, such as Heathy Woodland, traps were spaced at 25 m. Baits for Elliott traps consisted of a mixture of quick oats, peanut butter and honey, whilst those for cage traps had sardines added to this mixture. Systematic reptile trapping was carried out on one occasion only, when funnel traps were used in March 2006. Funnel traps were set at five-metre intervals along a 30 cm high aluminium flywire drift fence that extended for 60 m. Bird observations were mostly incidental records obtained during trapping operations and around campsites and did not involve systematic bird censuses. Due to a lack of rain, intense searching for frogs was carried out only on one night in March 2006.

Overall, 2686 trap-nights were completed in eight Ecological Vegetation Classes (EVCs) (DSE 2004). These were made up of 1824 Elliott trap-nights, 754 cage trap-nights, 60 funnel trap-nights and 48 harp trap-nights. Fourteen spotlight hours were completed (Table 1).

Results

One hundred and fourteen vertebrate species were recorded during the surveys. These included 30 mammals (Table 2), of which 17 were eutherian, 12 marsupial and one monotreme. Twenty-five of the mammal species were native and five were introduced. One of the target species, the Long-nosed Potoroo, was not recorded during trapping sessions in Wet Heathland in the Victoria Valley and Wannon Valley.

The Smoky Mouse was recorded in Damp Forest (12 individuals) and in Lowland Forest adjoining Damp Forest (four individuals), in gullies on the south-eastern slopes of the Victoria Range. The Heath Mouse (Fig. 1) was found in Sand Heathland in the Victoria Valley (four individuals) and the southern Wannon Valley (six individuals) and in Heathy Woodland (one individual) in the far southern Victoria Valley. The Southern Brown Bandicoot was captured in Sand Heathland (one individual) in the central Victoria Valley and in Wet Heathland (two individuals) in the southern Wannon Valley.

The Agile Antechinus *Antechinus agilis* was the most common and widespread marsupial recorded and was found in every EVC except Sand Heathland. The Yellow-footed Antechinus *Antechinus flavipes*, however, was captured on only one occasion, in Heathy Woodland in the central Wannon Valley. The Dusky Antechinus *Antechinus swainsonii* was recorded in Wet Heathland, Lowland Forest, Damp Forest, Heathy Dry Forest and Sand Heathland in the Victoria Range and Victoria Valley. The species was recorded in good numbers in Montane Rocky Shrubland on Mt William in 2002 (Menkhorst and Homan unpubl. data); however, none was captured there during the FSG trapping session in March 2005. Several individuals of the pale form of Dusky Antechinus were captured in the far southern Victoria Valley in March 2007. The Swamp Rat *Rattus lutreolus*, the only native member of this genus found in the Grampians (Menkhorst 1995), was recorded in Lowland Forest, Damp Forest, Sand Heathland and Wet Heathland in the Victoria Range, Victoria Valley and southern Wannon Valley.

Nine species of insectivorous bats were recorded during the surveys. The best sites for bat captures using harp traps occurred in Lowland Forest and Heathy Woodland, and consequently most records came from these EVCs. The Eastern False Pipistrelle *Falsistrellus tasmaniensis* (front cover), an uncommon species in western Victoria that shows a preference for riparian areas (Menkhorst 1995), was captured at one site only in the central Wannon Valley, where a harp trap was placed over a narrow section of the Wannon River. The Sugar Glider *Petaurus breviceps* and Common Brushtail Possum *Trichosurus vulpecula* were both recorded in Heathy Woodland in the Wannon Valley, whilst the Common Ringtail Possum *Pseudocheirus peregrinus* was found in Lowland Forest in the Victoria Range and Heathy Woodland in the central Wannon Valley. The Koala *Phascolarctos cinereus* was recorded once only, in Lowland Forest in the Victoria Range. The Western Grey Kangaroo *Macropus fuliginosus* was seen only in the western survey areas in the Victoria Valley.

Seventeen reptiles were recorded (Table 3), including one gecko, eleven skinks and five elapid snakes. The majority of active reptile searching took place in the Victoria

Table 1. Survey methods, trap-nights and spotlight hours (effort) completed for each Ecological Vegetation Class (EVC).

EVC	Elliott	Cage	Funnel	Harp	Spotlight Hours
Heathy Dry Forest	50	90		4	2
Lowland Forest	260	30		18	2
Damp Forest	370				
Sand Heathland	240	270			
Wet Heathland	30	306			
Heathy Woodland	490		60	24	10
Montane Rocky Shrubland	284			2	
Shrubby Foothill Forest	100	58			
Total Effort	1824	754	60	48	14

Table 2. List of mammals and total numbers recorded during surveys. E = estimated numbers; * indicates introduced species.

Common Name	Scientific Name	No.
Short-beaked Echidna	*Tachyglossus aculeatus*	7
Yellow-footed Antechinus	*Antechinus flavipes*	1
Agile Antechinus	*Antechinus agilis*	63
Dusky Antechinus	*Antechinus swainsonii*	26
Southern Brown Bandicoot	*Isoodon obesulus*	3
Koala	*Phascolarctos cinereus*	1
Common Brushtail Possum	*Trichosurus vulpecula*	8
Sugar Glider	*Petaurus breviceps*	6
Common Ringtail Possum	*Pseudocheirus peregrinus*	2
Eastern Grey Kangaroo	*Macropus giganteus*	20E
Western Grey Kangaroo	*Macropus fuliginosus*	20E
Red-necked Wallaby	*Macropus rufogriseus*	10E
Black Wallaby	*Wallabia bicolor*	6
White-striped Freetail Bat	*Tadarida australis*	3
Gould's Wattled Bat	*Chalinolobus gouldii*	5
Chocolate Wattled Bat	*Chalinolobus morio*	95
Large Forest Bat	*Vespadelus darlingtoni*	15
Southern Forest Bat	*Vespadelus regulus*	6
Little Forest Bat	*Vespadelus vulturnus*	74
Eastern False Pipistrelle	*Falsistrellus tasmaniensis*	7
Lesser Long-eared Bat	*Nyctophilus geoffroyi*	58
Gould's Long-eared Bat	*Nyctophilus gouldii*	7
House Mouse *	*Mus musculus*	1
Smoky Mouse	*Pseudomys fumeus*	16
Heath Mouse	*Pseudomys shortridgei*	11
Swamp Rat	*Rattus lutreolus*	22
Red Fox *	*Vulpes vulpes*	2
House Cat (Feral) *	*Felis catus*	4
Goat (Feral) *	*Capra hircus*	1
Red Deer *	*Cervus elaphus*	2

Valley in Heathy Dry Forest amongst rocky outcrops with many fallen logs. In this habitat numerous species were found, including Southern Water Skink *Eulamprus tympanum*, White's Skink *Egernia whitii*, Delicate Skink *Lampropholis delicata*, Garden Skink *Lampropholis guichenoti*, Boulenger's Skink *Morethia boulengeri*, Coventry's Skink *Niveoscincus coventryi*, Stumpy-tail Lizard *Tiliqua rugosa*, Little Whip Snake *Parasuta flagellum* (Fig. 2) and Eastern Brown Snake *Pseudonaja textilis*.

The Southern Water Skink, which is widespread over much of southern Victoria (Cogger 2000), was also seen basking in Montane Rocky Shrubland in the Victoria Range and on Mt William. The Black Rock Skink *Egernia saxatilis* was seen basking also at these two locations. The arboreal and rock-inhabiting Spencer's Skink *Pseudemoia spenceri*, which reaches

Fig. 1. Heath Mouse *Pseudomys shortridgei*. Photo by Peter Homan.

the western limits of its range in the Grampians (Wilson and Swan 2003), was found on only one occasion, near the summit of Mt William. The Eastern Three-lined Skink *Bassiana duperreyi* and the Blotched Blue-tongued Lizard *Tiliqua nigrolutea* were both captured in funnel traps in Heathy Woodland in the central Wannon Valley. The White-lipped Snake *Drysdalia coronoides* was recorded on three occasions in Heathy Woodland in the central Wannon Valley and once in Heathy Woodland in the far southern Victoria Valley. The Lowland Copperhead *Austrelaps superbus* was found in Heathy Woodland in the central Wannon Valley and Heathy Dry Forest in the Victoria Valley, whilst the Tiger Snake *Notechis scutatus* was found in Lowland Forest in the Victoria Valley and Heathy Woodland in the southern Wannon Valley. The Marbled Gecko *Christinus marmoratus* was recorded once in Heathy Woodland in the Wannon Valley.

Three species of amphibians were recorded (Table 4). Several Southern Brown Tree Frogs *Litoria ewingii* and Southern Bullfrogs *Limnodynastes dumerilii* were found crossing a road during rain in Heathy Woodland in the central Wannon Valley in March 2006. The Common Froglet *Crinia signifera* was also recorded in this EVC and was heard calling in Wet Heathland in the Victoria Valley.

Sixty-four species of birds were recorded (Table 5). Two species were recorded as breeding in the park. These were the vulnerable Powerful Owl *Ninox strenua* (juvenile bird seen on road in Heathy Dry Forest in the Victoria Valley in December 2003) and the White-browed Scrubwren *Sericornis frontalis* (dependent young in Heathy Dry Forest in the Victoria Valley in December 2003). The Powerful Owl was also recorded from Lowland Forest in the Victoria Valley, where one bird was heard. Most bird records came from the vicinity of FSG campsites in Heathy Woodland in the central Wannon Valley and in Heathy Dry Forest and Lowland Forest in the Victoria Valley. In the central Wannon Valley these included Southern Boobook *Ninox novaeseelandiae*, Azure Kingfisher *Alcedo azurea*, Eastern Yellow Robin *Eopsaltria australis*, Striated Pardalote *Pardalotus striatus*, Weebill *Smicrornis brevirostris* and New Holland Honeyeater *Phylidonyris novaehollandiae*. In the Victoria Valley species included Eastern Spinebill *Acanthorhynchus tenuirostris*, Golden Whistler *Pachycephala pectoralis*, Grey Shrike-thrush

Table 3. List of reptiles and numbers recorded during surveys.

Common Name	Scientific Name	Number
Marbled Gecko	*Christinus marmoratus*	1
Eastern Three-lined Skink	*Bassiana duperreyi*	8
Black Rock Skink	*Egernia saxatilis*	7
White's Skink	*Egernia whitii*	8
Southern Water Skink	*Eulamprus tympanum*	27
Delicate Skink	*Lampropholis delicata*	1
Garden Skink	*Lampropholis guichenoti*	11
Boulenger's Skink	*Morethia boulengeri*	1
Coventry's Skink	*Niveoscincus coventryi*	3
Spencer's Skink	*Pseudemoia spenceri*	1
Blotched Blue-tongued Lizard	*Tiliqua nigrolutea*	1
Stumpy-tail Lizard	*Tiliqua rugosa*	1
Lowland Copperhead	*Austrelaps superbus*	3
White-lipped Snake	*Drysdalia coronoides*	4
Tiger Snake	*Notechis scutatus*	3
Eastern Brown Snake	*Pseudonaja textilis*	2
Little Whip Snake	*Parasuta flagellum*	1

Table 4. List of amphibians and numbers recorded during surveys.

Common Name	Scientific Name	Number
Southern Brown Tree Frog	*Litoria ewingii*	6
Common Froglet	*Crinia signifera*	3
Southern Bullfrog	*Limnodynastes dumerilii*	7

Fig. 2. Little Whip Snake *Parasuta flagellum*. Photo by Stuart Dashper.

Table 5. List of birds and numbers recorded during surveys. E = estimated numbers; * indicates introduced species.

Common Name	Scientific Name	Number
Emu	*Dromaius novaehollandiae*	1
Brown Goshawk	*Accipiter fasciatus*	3
Wedge-tailed Eagle	*Aquila audax*	8
Australian Kestrel	*Falco cenchroides*	1
Common Bronzewing	*Phaps chalcoptera*	5
Yellow-tailed Black-Cockatoo	*Calyptorhynchus funereus*	60E
Gang-gang Cockatoo	*Callocephalon fimbriatum*	100E
Long-billed Corella	*Cacatua tenuirostris*	1
Sulphur-crested Cockatoo	*Cacatua galerita*	20E
Rainbow Lorikeet	*Trichoglossus haematodus*	10E
Musk Lorikeet	*Glossopsitta concinna*	20E
Little Lorikeet	*Glossopsitta pusilla*	2
Crimson Rosella	*Platycercus elegans*	40E
Blue-winged Parrot	*Neophema chrysostoma*	2
Pallid Cuckoo	*Cuculus pallidus*	2
Fan-tailed Cuckoo	*Cuculus flabelliformis*	3
Powerful Owl	*Ninox strenua*	2
Southern Boobook	*Ninox novaeseelandiae*	4
Tawny Frogmouth	*Podargus strigoides*	1
Australian Owlet-nightjar	*Aegotheles cristatus*	1
Azure Kingfisher	*Alcedo azurea*	1
Laughing Kookaburra	*Dacelo novaeguineae*	12
Sacred Kingfisher	*Halcyon sancta*	2
Welcome Swallow	*Hirundo neoxena*	6
Tree Martin	*Hirundo nigricans*	15E
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	3
White's Thrush	*Zoothera dauma*	1
Blackbird *	*Turdus merula*	2
Scarlet Robin	*Petroica multicolor*	3
Eastern Yellow Robin	*Eopsaltria australis*	20E
Crested Shrike-tit	*Falcunculus frontatus*	1
Golden Whistler	*Pachycephala pectoralis*	15
Rufous Whistler	*Pachycephala rufiventris*	10
Grey Shrike-thrush	*Colluricincla harmonica*	12
Leaden Flycatcher	*Myiagra rubecula*	1
Restless Flycatcher	*Myiagra inquieta*	1
Grey Fantail	*Rhipidura fuliginosa*	40E
Willie Wagtail	*Rhipidura leucophrys*	2
Superb Fairy-wren	*Malurus cyaneus*	40E
Southern Emu-wren	*Stipiturus malachurus*	12
White-browed Scrubwren	*Sericornis frontalis*	40E
Weebill	*Smicrornis brevirostris*	2
Brown Thornbill	*Acanthiza pusilla*	40E
Striated Thornbill	*Acanthiza lineata*	1
White-throated Treecreeper	*Cormobates leucophaea*	15E
Red Wattlebird	*Anthochaera carunculata*	15E
Yellow-faced Honeyeater	*Lichenostomus chrysops*	2
White-eared Honeyeater	*Lichenostomus leucotis*	3
White-plumed Honeyeater	*Lichenostomus penicillatus*	1
Brown-headed Honeyeater	*Melithreptus brevirostris*	4
White-naped Honeyeater	*Melithreptus lunatus*	30E
Crescent Honeyeater	*Phylidonyris pyrrhoptera*	7
New Holland Honeyeater	*Phylidonyris novaehollandiae*	50E
Eastern Spinebill	*Acanthorhynchus tenuirostris*	9
Spotted Pardalote	*Pardalotus punctatus*	10E
Striated Pardalote	*Pardalotus striatus*	3
Silvereye	*Zosterops lateralis*	4
Red-browed Firetail	*Neochmia temporalis*	20E
Dusky Woodswallow	*Artamus cyanopterus*	5
Australian Magpie	*Gymnorhina tibicen*	1

Table 5 cont'd.

Common Name	Scientific Name	Number
Pied Currawong	*Strepera graculina*	7
Grey Currawong	*Strepera versicolor*	4
Australian Raven	*Corvus coronoides*	7
Forest Raven	*Corvus tasmanicus*	3

Colluricincla harmonica, Rufous Whistler *Pachycephala rufiventris*, Restless Flycatcher *Myiagra inquieta* and Gang-gang Cockatoo *Callocephalon fimbriatum*. Several woodland birds that are in decline nationally (Barrett *et al.* 2003) were recorded, including Scarlet Robin *Petroica multicolor* (Sand Heathland), Crested Shrike-tit *Falcunculus frontatus* (Heathy Woodland) and Dusky Woodswallow *Artamus cyanopterus* (Wet Heathland and Heathy Woodland). One species often difficult to detect in the Grampians, the Southern Emu-wren *Stipiturus malachurus*, was recorded in Sand Heathland in the Victoria Valley.

Discussion

The Smoky Mouse is known from a number of sites in south east New South Wales, coastal east Gippsland, Victoria's eastern highlands, the Otway Ranges and the Grampians (Menkhorst 2001). In the Grampians the species is known from a number of locations (Atlas of Victorian Wildlife) and has been the subject of intensive population studies on Mt William (Cockburn 1981a, 1981b). The Smoky Mouse is listed as endangered under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* and it is listed as a threatened species under the Victorian *Flora and Fauna Guarantee Act 1988*. Records exist from a range of vegetation communities, including coastal heath, sub-alpine heath, dry forest and occasionally fern gullies in wet forest (Menkhorst 1995). There is, however, evidence that some records from wet gullies may represent dispersing animals rather than resident populations (Menk-horst and Broome 2003). A key component of all sites, except wet gullies, is the predominance of shrubs from the Heath family (Epacridaceae) and Pea family (Fabaceae) (Menkhorst and Seebeck 1981). Smoky Mouse has been recorded from fern gullies in the Grampians near Silverband Falls between October 1962 and June 1971 (Atlas of Victorian Wildlife) and in the Victoria Range in October 1974 (Atlas of Victorian Wildlife) and March and April 2002 (Menkhorst and Homan unpubl. data). Trapping rates for the species are usually low. However, in the Grampians high rates have been achieved at two sites: on Mt William rates as high as 12% have been recorded (Cockburn 1981a, 1981b) and in a fern gully in the Victoria Range a rate of 19% was achieved over several nights in March and April 2002 (Menkhorst and Homan unpubl. data).

In December 2003 and March 2004 the FSG trapped in the fern gully in the Victoria Range mentioned above. On both occasions Smoky Mouse was recorded at trapping rates of 6% and 5·5% respectively. Vegetation at this site consists of an overstorey of Brown Stringybark *Eucalyptus baxteri* and some Mountain Grey Gum *Eucalyptus cypellocarpa*, with a sparse understorey of Blackwood *Acacia melanoxylon*. There are numerous Rough Tree-fern *Cyathea australis* and many fallen logs amongst a tangle of Forest Wire-grass *Tetrarrhena juncea* and Austral Bracken *Pteridium esculentum*. The records obtained from this site in 2003 and 2004, together with the records of 1974 and 2002, strongly suggest that the population of Smoky Mouse in this wet gully is permanent. It is probable that the species uses the very thick cover provided in this gully for nesting sites and shelter and moves out onto surrounding slopes for feeding, where, within several hundred metres, there is a predominance of shrubs such as Rough Bush-pea *Pultenaea scabra*.

Also in March 2004, 60 Elliott traps were set over two nights in and beside a wet gully approximately two km north-east of the fern gully mentioned above. No Smoky Mouse were captured on the first night.

However, on the second night four juvenile Smoky Mouse were captured in traps set in Lowland Forest on the very edge of the gully, suggesting that these individuals were dispersing (P Menkhorst pers. comm.). The vegetation and habitat at this site is similar to that at the first gully, except for the absence of tree-ferns and the presence of Victorian Christmas Bush *Prostanthera lasianthos*.

Mt William has been a stronghold for Smoky Mouse in the Grampians (Menkhorst 1995). However, none was captured there during a trapping session involving 284 trap-nights by the FSG in March 2005. In March 2002, Menkhorst and Homan (unpubl. data) captured only one Smoky Mouse near the summit of Mt William from 500 trap-nights. Furthermore, the species was not recorded at Silverband Falls during trapping surveys in March 2002 (Menkhorst and Homan unpubl. data) and in September 2005 (RMIT University unpubl. data). With the apparent decline of Smoky Mouse populations on Mt William and at Silverband Falls, along with the wildfires of 2005/2006 that burnt a significant proportion of the Grampians, it now appears that the Victoria Range supports an important population of Smoky Mouse in the Grampians National Park.

The Heath Mouse has been recorded at many locations throughout the Grampians National Park (Seebeck 1976; Emison *et al.* 1978; Meulman and Klomp 1999), especially in areas of dry heath or heathy woodland. Capture rates for the species during recent surveys have been low. In March and April 2002, Menkhorst and Homan (unpubl. data) achieved capture rates of 0·2% near the summit of Mt William, 1·3% in the Wannon Valley and 1·3% at Mirranatwa Gap in the Serra Range. During surveys by the FSG trapping rates were 1% in Sand Heathland in the Victoria Valley in December 2003, 2·3% in Sand Heathland in the southern Wannon Valley in March 2006 and 0·6% in Heathy Woodland in the far southern Victoria Valley in March 2007. However, in Sand Heathland in the Victoria Valley in March 2004, a trapping rate of 7·5% was achieved.

The Southern Brown Bandicoot is widespread and not uncommon in the Grampians (Menkhorst 1995). Trapping rates can be low, and in surveys conducted by Parks Victoria in the spring of each year between 2003 and 2006, the species was recorded in very low numbers (M Stevens pers. comm.). In other parts of Victoria capture rates for Southern Brown Bandicoots can vary significantly. In Wimmera Grassy Woodland infested with Gorse *Ulex europaeus* in the Black Range near Stawell, the FSG achieved a capture rate of 8·6% between 2000 and 2002 (Homan 2005). However, a survey in April 2007, in Coastal Heathland at Wonthaggi, produced a rate of only 0·5% (Homan 2007). During the FSG Grampians surveys trapping rates were also low with 1% in Sand Heathland in the Victoria Valley in 2003 and 0·6% in Sand Heathland and Wet Heathland in the southern Wannon Valley in March 2006. The Southern Brown Bandicoot has high fecundity and high juvenile dispersal rates and is easily able to colonise suitable habitat as it becomes available (Menkhorst 1995). Large areas of good quality bandicoot habitat escaped the fires of 2005/2006, and the remaining population of Southern Brown Bandicoots in these areas should expand significantly, as young dispersing bandicoots colonise the regenerating vegetation.

There was a major decline in the numbers of insectivorous bats captured in harp traps following the wildfires of 2005/2006. In March 2005, prior to the fires, 11 harp trap-nights were completed in Heathy Woodland in the Wannon Valley, resulting in the capture of 168 insectivorous bats of eight species. In March 2006, 13 harp trap-nights were completed at the same site as the previous year, on the edge of the unburnt portion of the park, but only 28 bats were caught, comprising the same species. Capture rates varied significantly, with Chocolate Wattled Bat *Chalinolobus morio*, declining from 42% of total bats caught in 2005 to only 3·6% in 2006. Large Forest Bat *Vespadelus darlingtoni* and Little Forest Bat *Vespadelus vulturnus*, however, increased from 3% to 25% and 18% to 32% respectively. The capture rate for the rarer Eastern False Pipistrelle remained constant at 3·6% of total bats caught. The severe drought that has persisted over much of western Victoria has

almost certainly had a detrimental effect on bat populations, but it appears that the extensive and devastating fires have also contributed to a major decline in the population of insectivorous bats in the Grampians.

Previous records exist for the Powerful Owl in the Grampians, but the drier inland western woodlands and forests are not a stronghold for the species (Emison *et al.* 1987). In particular, most breeding records are from coastal and foothill forests, so the chance sighting of a juvenile Powerful Owl on a road in the Victoria Valley is noteworthy. It is highly probable that this bird was dispersing (no adults were seen or heard nearby) and considering the vast size of the Grampians Range, it is fair to conclude that this young bird was the product of a breeding pair of Powerful Owls in the Grampians National Park.

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One Hundred Years Ago

WILD LIFE OF THE MURRAY SWAMPS
by A.H.E. Mattingley, C.Z.M.S.

A Reed-Warbler sang gaily to its mate, and its notes were welcome music to the tired-out ornithologists. The antithesis of a good thing is usually close at hand, so here was a Grass-bird, *Megalurus gramineus*, in the same patch of reeds, uttering its mournful note. What freak of evolution could cause a bird somewhat similar in size, colour, and nesting habits to produce notes with such a contrast.

From *The Victorian Naturalist* **XXV** p. 62, August 1908

Wild Orchids of Victoria Australia

by Jeffrey Jeanes
and Gary Backhouse

Publisher: *Aquatics Photographics, 2006. 315 pages, hardback; colour photographs. ISBN 097753720X. RRP $99.95*

Jeanes and Backhouse have produced another striking book on indigenous orchids. Quite different from their reference book from 1995, it records in beautiful colour photographs all the currently known Victorian orchids. They have included multiple photos of most species to allow us to appreciate the amazing diversity in form and colour as well as the exquisite beauty of Victoria's orchids. As well as showcasing the orchids, the authors have provided a very simple method of identifying them in the field.

The authors' enthusiasm and dedication to their subject is obvious – 'Victoria has an orchid flora of extraordinary richness, comparable with the best in the world for its diversity of terrestrial orchids... About 40% of the species are either endemic or now restricted entirely to Victoria. It is only through increased education and awareness, accepting responsibility, protection and careful management that we can safeguard this irreplaceable asset...' Orchids can be found in many habitats, 'from coastal sand dunes to the tops of the highest mountains...and are only totally absent from saline areas'.

The stated principal aim of the book is to 'facilitate the identification of all the currently recognised orchid taxa in Victoria'. In order to identify an orchid we are directed first to find the genus to which it belongs by referring to the pictorial guide to genera at the front of the book. Here on a double page each genus is represented by a photo that directs us to a page number where the species for that genus begin. Then by leafing through the various species and reading the text a match should be found. I think the pictorial guide is a great idea. It is very accessible, being so easy to use, and is much faster than working through a key.

Alternatively, a botanical key to the genera is provided, with a simple explanation of how to use it. Possibly the inclusion of species keys would broaden the book's appeal. I feel a little uneasy about the references in the statements at the beginning of the key to underground parts of orchids. Without a specific warning against collecting specimens without authorisation, a message might be inadvertently communicated that it is acceptable to interfere with these vulnerable plants. I think it is an oversight not to include such a warning. All Victorian native orchids are protected under the *Flora and Fauna Guarantee Act 1988* (Backhouse and Jeanes 1995). The pictorial emphasis of the book makes it accessible and appealing to people who may not yet have an awareness of the disastrous effects of digging up or picking orchids.

The introduction includes brief general notes on such topics as taxonomy, geography, climate and habitats, orchid form, ecology and biology, and conservation. The glossary and labelled photos, showing

labellum features and the floral parts of a number of different forms of terrestrial orchids, are both essential to the book. Not all the features are clear from the photos. Line drawings could have been more instructive in some cases. There are photographs showing nine habitats, with a list of some of the orchids that might be found in each. I think the habitat photos are a good feature, although I don't see much point in the lists. In total only about one quarter of the orchids covered in the book are listed here. I presume that those listed are the more typical for these habitats. Foothill forests and moist foothill forests are not included here but are mentioned in the text. The index is easy to use and includes both common and scientific names. Maps of Victoria on the endpapers show place names mentioned in the text.

There is a checklist, and a bibliography which together take up about 20 pages out of 315. The bulk of the book contains photos and text for 364 species, some unnamed, plus 45 named and unnamed hybrids, being all currently known taxa at the time of writing. The orchids are arranged 'according to their similarity of appearance reflecting their relationships' so that closely related taxa can be compared easily. This generally follows *The Flora of Victoria* Vol. 2 (Walsh and Entwisle 1994). The photos number 'about 1400' and are of the highest quality. Multiple photos cover most of the page and often include a number of shots of the same species to show the diversity within the species. Photographs often show orchids in their habitat with leaves sometimes shown as well. There are close-ups showing particular features, and place names are given for each photo. Someone unfamiliar with indigenous orchids might be misled by the close-ups as there is no scale. Size is referred to in the text. Although the photos are spectacular, not all of them add information. I would like to see distribution maps for each species replacing some of the photos.

For each genus there is a brief description including number of species, distribution, and general information relating to growth form and flowers and leaves. Other notes may refer to taxonomy, response to fire, and reproduction. The derivation of the generic name is included.

The species account includes the scientific name with the taxonomic authority and one common name, but no synonyms. The description includes height, number and size of flowers, and features of the leaf 'where applicable'. Distinguishing flower features are given where they would help in idenification. Flowering period, distribution, 'Broad Vegetation Type' (developed by the Department of Sustainability and Environment), conservation status, hybridisation and distinguishing features are all included. I think the conservation status should have been highlighted in some way to attract attention, especially for the rare and threatened species. At times the lack of a leaf description was frustrating to me in the species account when I was trying to identify an orchid by the leaf and bud only.

Although the authors call this book a field guide, with dimensions 28 x 21 x 3 cm (pages slightly smaller than A4) it makes a reasonably bulky book to carry in your pack. I think of field guides as being smaller and lighter. In the field it fulfils its aim. On a recent walk in Box Ironbark forest I used the book to identify a number of species. My companion using the keys of the *Flora of Victoria* came to the same conclusions.

Overall, this is a very appealing and useful book. The photos alone would attract people with no previous interest in orchids, and the pictorial guide would probably get an observant and determined beginner to the correct genus and possibly species. Quite an achievement! Readers with more knowledge would also gain pleasure and satisfaction from the book. I think the authors will achieve their aim to raise awareness of Victoria's indigenous orchids.

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Cedric Cuthbert Ralph

19 April 1907 – 2 November 2007

On 13 December 1920 Cedric C Ralph was elected to the Field Naturalists Club of Victoria, as a junior member, at the age of 13. This was a propitious event for an aspiring young lepidopterist. It was here he met Alex Burns, an entomologist who acted as a mentor and became a life-long friend. Among others, Cedric also met Charles Hamilton French, the Government Entomologist. In a tribute to Alex Burns, Ralph (1959) recalled the excitement of excursions with him and CH French to Springvale, Mt. Donna Buang, Frankston and Healesville.

Sometime in the late 1920s Cedric Ralph's membership seems to have lapsed, as his name does not appear in the 1927 or 1932 membership lists. He was re-elected as an Ordinary member in 1938, in time to become one of 'The Gang', the people who gathered once a month on Sundays at Stan Colliver's house in Essendon to discuss all aspects of natural history. These meetings came to an end with the outbreak of World War II.

As a friend who composed a eulogy in verse said of Cedric:

> He preferred a night in the bush to a night in the pub,
> And was made a lifetime member of the Field Naturalists Club.

That honour was accorded Cedric in 1978, to mark his 40 years of membership. On this occasion he made a generous donation of $250 to the Club.

In 1942 Cedric Ralph joined the RAAF, and was posted to New Guinea to work on cyphers. He recorded his observations while flying over the Great Barrier Reef (Ralph 1942), and a further note from Pilot Officer CC Ralph recounted the excruciating effects of treading on a stone-fish, which someone in the camp in New Guinea did. Fortunately the man survived (Ralph 1943). In 1943 Cedric was recalled to Point Cook, where he worked as an instructor until the end of the war.

Cedric Ralph was born in Malvern in 1907 into a legal family and, in spite of his interest in natural history, literature and the arts, it was expected that he would follow his father into the legal profession. After World War II he set up his own law firm and thereafter led a distinguished career.

At the age of 82, in possession of his first computer, Cedric began to write his autobiography, in which he stated

> My copious reading had brought me round to ... a Marxist interpretation of history. In the last resort it is the wealthy, those with power, who cause wars, and it is the poor who fight them.

Consequently, in 1940 he decided

> to join forces with that body which I thought most nearly in agreement with my conclusions and ... that was the Communist Party.

It was this affiliation that brought many clients to Cedric Ralph's practice. In 1950 he led the Victorian legal effort against the Menzies government's legislation to outlaw the Communist Party, and was the instructing solicitor to HV Evatt in this

campaign, which resulted in the repealing of the *Communist Party Dissolution Act* 1950, in March 1951. In 1954 he represented the Communist Party before the Royal Commission into the Petrov affair.

He acted for the British Migrants Association in their campaign for the improvement of conditions for the first British migrants, and he challenged the White Australia Policy on behalf of potential Asian migrants who had fought alongside the Australians against the Japanese. Although not directly involved, he advised Frank Hardy on his choice of solicitor in the libel case over *Power Without Glory*.

In 1980 Cedric Ralph and his second wife, Clare, retired to the cottage at Balook, which he had bought in 1954, now surrounded by the Tarra Bulga National Park. This was not to be a quiet time of liesurely, rural pursuits. In an effort to preserve his beloved bush Cedric took on the Australian Paper Mills over logging, and the locals called him 'the first environmentalist'. His efforts to preserve the bush and his involvement in local affairs have been recognised in the recent planting of an avenue of 100 trees in Balook.

Cedric Ralph had an extensive library, and in 2000 he donated most of his natural history books to the Club, driving up from Balook to deliver them.

Age did not weary him, but at the age of 94 he was banned from working on the roof of his house. In 2005, aged 98, he had his driver's licence withdrawn. In the same year Cedric Ralph made headlines again during an exceptionally heavy snowstorm in the Strezelecki Ranges, when he collapsed at his home, and it took the SES four hours to clear the road so that an ambulance could reach him.

As his versifying friend recalled, once Cedric was removed from the bush to an aged care home, he frequently said 'The end can't come too soon'.

In his own words in 1995, Cedric Ralph wrote

> these people [FNCV members] and no doubt first among them Alex Burns, enriched my life to such an extent that even now, daily, I experience the benefit.

He was, indeed, a true naturalist.

I have drawn heavily on Robyn Whiteley's obituary in the Sydney Morning Herald, for much of this information, and am indebted to Heather Burcombe for further detail.

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One Hundred Years Ago

EXCURSION TO THE YOU YANGS

Three species of plants are noteworthy as characteristic of the You Yangs -viz., *Prostanthera nivea*, which should be called the "Snowy Mint-bush"; the Rock or Parsley Fern, *Cheilanthes tenuifolia*, which occurs in great patches everywhere; and the Blue Gum, *Eucalyptus globulus*, a species of eucalypt one would not expect to find in such an exposed situation. The Prostanthera was almost the first flower met with, and, though just past its best, the sight it presented in places was alone well worth the trip. The flowers are larger than most of our Prostantheras, and on some of the bushes were of quite a lilac shade. It is also worthy of remark that the plant does not appear to be inconvenienced by cultivation and clearing, for in the forest plantation, where the ground had been ploughed, it is again springing up; and in another part, where a fire had passed through it, the bushes are again branching out at the ground-level, and making good growth.

From *The Victorian Naturalist* **XXV** p. 125, December 1908